

Tectono-Stratigraphic Evolution of the Continental Shelf of Guyana and Suriname

Wenxiu, Yang ¹; Escalona, Alejandro ¹; Mann, Paul ² (1) University of Stavanger, Stavanger, Norway. (2) Institute for Geophysics, University of Texas, Austin, Texas, TX.

The Guyana & Suriname continental shelf is located along the passive margin of north eastern South America, just south of the eastern Venezuelan and Trinidad large hydrocarbon provinces. With no major oil discoveries, the region is considered the second less explored basin in the world. We integrated ~3000 km of industry 2D seismic reflection and information from 13 offshore published wells to provide a regional framework. Four main stratigraphic sequences on both well and seismic data from Cretaceous to Pliocene were recognized:

Sequence 1, of Cretaceous age, consists shelfal sedimentation and submarine fan systems into the deep water evidenced by deep incised valleys in the shelf. Also, world class Turonian source rocks were deposited in the shelf. A main Cretaceous depocenter is located to the SE of the study area. This depocenter coincides with a free-air gravity low, suggesting a basement depression inherited from Jurassic. The Turonian shales show high TOC, but maturity levels are low in shelfal area, but it may be matured in SE depocenter.

Sequence 2, of Paleogene age, is ~0-600 ms thick, consists of shelfal clastic and carbonate deposition. Listric faults affect the shelf edge and slope, producing turbidites deposition. Along the Paleogene shelf, a NE-SW arch is interpreted. Onlapping Paleogene sediments into the top Cretaceous suggest the arch structure may reflect the collision of Caribbean plate into north- and central northern South America. Possible reservoirs include turbidates and shelfal sediments along the arch axis.

Sequence 3, of early to middle Miocene age, is 0-750 ms thick, consists of isolated carbonate platforms at the margin surrounded by siliciclastics. The sequence is progradational and has a major sequence boundary of middle Miocene age with incised valleys. This unconformity can be correlated with the middle Miocene unconformity observed in Trinidad, representing the peak of Caribbean orogeny. Possible reservoirs are sand filled incised valleys on top of the sequence.

Sequence 4, of upper Miocene to Pliocene age, is between 200-2000 ms thick, showing a large terrigenous progradational event. The shelf was built up by clear sigmoidal clinoforms from land sediment which may form good reservoirs with applicable seal rocks during the flooding of the shelf. The large change in the progradation pattern is related to sea level fall and change in the paleodrainage systems of northern South America.